CHAPTER 2
Partners in Cleanup

Introduction

The success of the Navy's environmental restoration efforts is due, in part, to the extensive use of partnerships. The Navy is establishing partnerships with a wide variety of groups and organizations including communities, Restoration Advisory Boards (RABs), federal, state and local regulators, Native American tribes, and various technical groups both within the Navy and with other branches of the government. These partnerships have led to numerous accomplishments such as the cleanup of sites, transfer of property, development of guidance, and sharing of knowledge. To achieve our environmental restoration vision for both the Installation Restoration Program and the Munitions Response Program, the Navy will continue to seek out beneficial partnerships.

Norfolk Naval Shipyard and Atlantic Wood Industries (AWI) partnered with regulators and community groups to achieve cleanup in a Joint Response Action.

"Thanks to this innovative agreement between EPA, the U.S. Navy and AWI, significant amounts of contamination from two Superfund sites will no longer threaten the Elizabeth River. This is an excellent example of the Superfund law's flexibility, and EPA applauds our partners for their cooperation in reaching a sound solution to a complex environmental problem."

EPA Regional Administrator, Donald S. Welsh

"Tremendous! A major, major breakthrough in the restoration of the Southern Branch of the Elizabeth River. Congratulations to all for persevering to overcome complex and daunting obstacles. Future generations will appreciate it."

Marjorie Mayfield-Jackson, Executive Director, Elizabeth River Project

"I see this as a breakthrough project, the benefits of which will extend far beyond the boundaries of this site. The relationship forged between its partners will be a foundation for success in future projects not yet started. It will demonstrate in a very real way what people and organizations, working together, can accomplish. That's the real power of a project like this - its potential to inspire others to take on new challenges, and achieve new successes that exceed anything we currently dare to expect.

Mike Host, Norfolk Naval Shipyard Environmental Division

(see page 3-59)

Navy Partners

Chief of Naval Operations (CNO)

Chief of Naval Operations, as one of the active partners in the restoration process, works to provide guidance in the form of written policy to remedial project managers (RPMs) and others responsible for Installation Restoration Program cleanup work. In FY 2003, CNO published a fact sheet on Watershed Contaminated Source Documents (WCSDs) to supplement their sediment policy issued the previous year (Figure 2.1).

CNO's Policy on Sediment Site Investigation and Response, issued in February 2002, requires a WCSD be prepared for contaminated sediment sites when there is potential for non-Navy sources to contribute to sediment contamination in a water body adjacent to Navy property. The WCSD fact sheet explains what a WCSD is, when it is required, what a WCSD should contain, how it can be used to determine the Navy's cleanup responsibilities, and how it can be used to determine the potential for Navy-remediated sediments to become recontaminated from other sources. The fact sheet is a valuable tool for communicating the policy and making the guidance readily available to a wider audience.

CHIEF OF NAVAL OPERATIONS – N45
Watershed Contaminated Source Document (WCSD)
MARCH 2003

FACT SHEET

This factsheet explains:

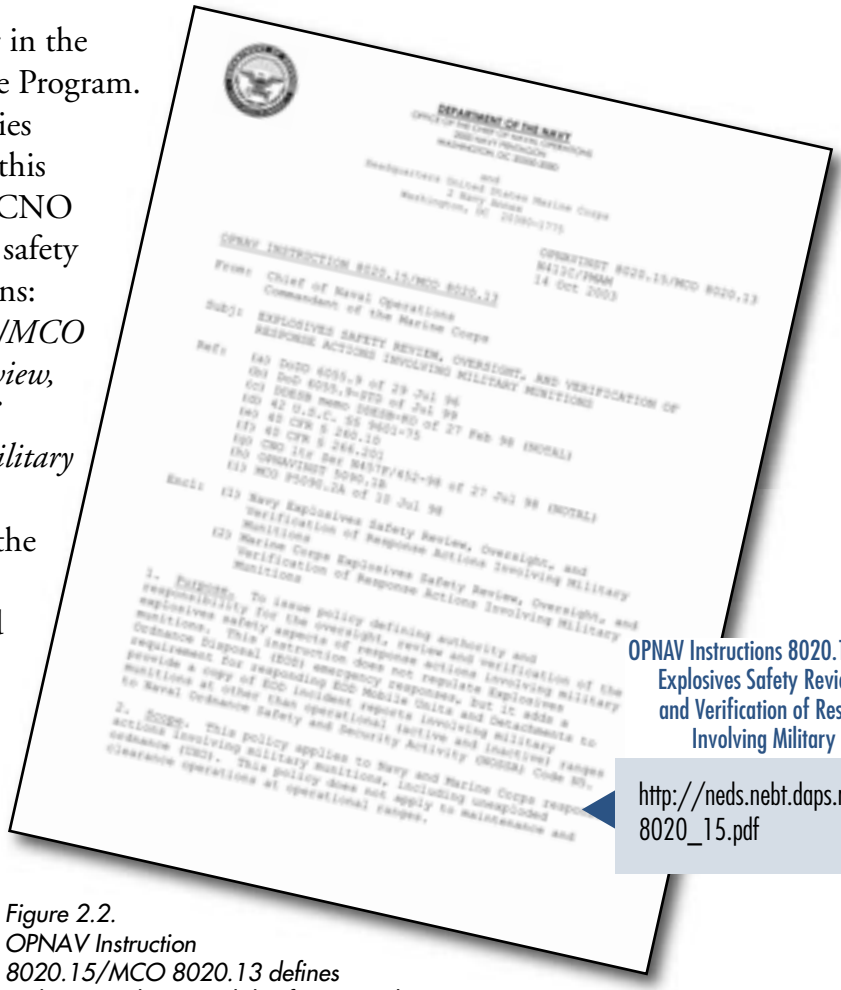
- What is a WCSD;
- When a WCSD is necessary;
- What are the contents of a WCSD;
- How the WCSD can be used to determine the Navy's cleanup responsibility in a water body; and
- How the WCSD can be used to evaluate the potential for Navy-remediated sediments to become re-contaminated from other sources.

Watershed Contaminated Source Document Fact Sheet

http://web.ead.anl.gov/ecorisk/related/documents/WCSD_Factsheet_Final_v2.pdf

Figure 2.1. In FY 2003, CNO published a fact sheet on Watershed Contaminated Source Documents (WCSDs) to supplement their sediment policy issued the previous year.

CNO is also a major partner in the growing Munitions Response Program. The Navy has initiated policies and partnerships to support this program. In October 2003, CNO issued a policy on explosives safety for munitions response actions: *OPNAV Instruction 8020.15/MCO 8020.13 Explosives Safety Review, Oversight, and Verification of Response Actions Involving Military Munitions* (Figure 2.2). The policy was needed to define the authority and responsibility for the oversight, review, and verification of the explosives safety aspects of response actions involving military munitions.



OPNAV Instructions 8020.15/MCO 8020.13 Explosives Safety Review, Oversight, and Verification of Response Actions Involving Military Munitions

http://neds.nebt.daps.mil/Directives/8020_15.pdf

Figure 2.2. OPNAV Instruction 8020.15/MCO 8020.13 defines authority and responsibility for oversight, review, and verification of explosives safety aspects of response actions involving military munitions.

Munitions Response Site Prioritization Protocol Proposed Rule. The Navy partners with the DoD on environmental restoration efforts, under both the Installation Restoration Program and Munitions Response Program. Under the Munitions Response Program, DoD proposed a rule that establishes the Munitions Response Site Prioritization Protocol (Federal Register Aug. 22, 2003, pp. 50899 – 50941). The purpose of the Protocol is to assign a relative priority for munitions responses to each location in the inventory of munitions response sites known or suspected of containing unexploded ordnance, discarded military munitions, or munitions constituents.

Munitions Response Site Prioritization Protocol

http://www.denix.osd.mil/denix/Public/News/OSD/MMRP/mmrp.html

Inventory of MRP Sites. During 2003, the Navy provided the results of their comprehensive munitions response site inventory to each state. The Navy is seeking verification of identified sites and soliciting information on any additional sites that may not have been previously identified. The results of DON's munitions response inventory are available on DoD's Knowledge Based Corporate Reporting System (KBCRS) accessible through Defense Environmental Network and Information (DENIX).

DoD's Knowledge Based Corporate Reporting System (KBCRS)

https://www.denix.osd.mil/denix/Public/News/EITM/KBCRS/kbcrs.html

Munitions Response Committee (MRC). DON participates in the DoD-led Munitions Response Committee (MRC) that focuses on development and execution of a sound Munitions Response Program. The MRC is a partnership between the military services, EPA, other federal land managers such as the Departments of Interior and Agriculture, and states and tribes. The purpose of the MRC is to:

- Develop collaborative decision-making processes that are acceptable to all participants
- Ensure protectiveness of munitions response actions
- Promote consistency in munitions response actions across the organizations represented
- Address the complexity and scope of cleanup challenges
- Foster development, validation, and use of improved technologies
- Provide munitions response lessons learned to appropriate forums for consideration.

Search for UXO

Field surveys for unexploded ordnance at Former NAF Adak (see page 3-13).

During 2003, the MRC focused on the development of a charter and several technical "white papers."

The Navy's Munitions Response Program took a big step forward with the award of a contract to conduct preliminary assessments at all known munitions response sites. This is a multi-year effort that is projected for completion by FY 2007.

NAVFAC

NAVFAC Headquarters is another of the active Navy partners in cleanup. NAVFAC Headquarters issued guidance in 2003 concerning post-Record of Decision (ROD) work. This guidance, *"Principles and Procedures for Specifying, Monitoring, and Enforcement of Land Use Controls and Other Post-ROD Actions,"* April 2003, will assist RPMs with their post-ROD efforts.

Optimizing remediation actions is recognized as an important step to expedite site closure. Optimization is a process that examines all aspects of the cleanup actions to find areas where a reduction in effort will provide the optimal data or cleanup results while reducing costs. To address this need, NAVFAC Headquarters initiated development of a policy on conducting independent optimization studies to facilitate effective optimization. This policy will be finalized in FY 2004. The policy requires an independent optimization review for most sites as part of the feasibility study and remedial design. The optimization review will focus on the appropriate implementation of optimization concepts. Under the policy, the following options (or combination thereof) will be available to the RPM for the optimization review:

- Naval Facilities Engineering Service Center Tiger Team Review
- Internal Technical Review
- Contracted, Third-Party Review.

One of these options must be specified in the NORM Cost-To-Complete database and associated costs must be incorporated into site budgets. Additionally, optimization will need to be considered by the RPM as part of the contracting and acquisition strategy. This may require use of several contracting vehicles, incremental funding, and performance goals for the contractor to implement optimization.

Optimization Leads to Cost Avoidance

Optimization of the groundwater treatment plant at the Allegany Ballistics Laboratory removed equipment no longer needed and led to significant annual cost avoidance for the treatment system. Use of passive diffusive bags, an innovative sampling technique, was implemented to avoid cost of long-term monitoring (see page 3-40).

NAVFAC Engineering Field Division and Activities

The dedication and commitment of our RPMs at the Engineering Field Divisions and Activities is one of the best examples of partnering. Each year CNO presents the NAVFAC Environmental Restoration Award (the "Drummie") to deserving RPMs from each EFD/A at the Navy and Marine Corps Cleanup Conference.

Figure 2.3. 2003 Navy and Marine Corps Cleanup Conference. The 2003 Environmental Restoration Employees of the Year Award Winners (from left to right): Mr. Art Conrad (Southern Division), Ms. Patty Kelly (EFA Northwest), Mr. Bryan Harre (NFESC), Mr. Mark Leipert (EFA Northeast), Mr. Neal Parker (EFA Chesapeake), and Mr. Juris Sinats (EFA West).

The Fiscal Year 2003 were awarded to the following individuals:

Engineering Field Activity Northeast Restoration Employee of the Year
Mr. Mark Leipert, P.G. - Mr. Leipert is an experienced geologist and Remedial Technical Manager who has been doing an outstanding job managing the Environmental Baseline Survey (EBS) work for the former Naval Air Station (NAS) South Weymouth, MA. At the start of the EBS, there were more than 100 Environmental Baseline Review

Item Areas. Mark's tireless efforts successfully attained regulatory approval of No Further Action on 55 of these areas in FY 2002. In addition, he was instrumental in resolving highly contentious background issues at the site, which threatened to delay cleanup at this BRAC installation.

Southwest Division Restoration Employee of the Year
Ms. Content Arnold - Ms. Arnold has made significant contributions to the Navy's Installation Restoration Program as the Lead RPM for the former Marine Corps Air Stations at Tustin and El Toro. She managed and executed projects within budget and ahead of schedule within a climate of highly dramatic political pressures. Ms. Arnold successfully directed her team of RPMs to complete numerous time-critical projects, to initiate several cleanup efforts, and to support disposal strategies at both Tustin and El Toro, including the successful conveyance of more than 1,100 acres to the City of Tustin in May 2002.

Pacific Division Restoration Employee of the Year
Mr. Cowan Azuma - Mr. Azuma was instrumental in completing investigations at the Waikele Branch of Naval Magazine Pearl Harbor in support of the Ford Island Development. This project required a high degree of coordination with many departments within NAVFAC Pacific Division (Planning, Real Estate, Design, Program Management) as well as the customer, Commander of the Navy Region Hawaii. He worked closely with the Planning and Real Estate Departments in defining the requirements and schedules, adjusting environmental efforts to meet changing development plans. He skillfully resolved very challenging technical issues at Waikele such as munitions, background analysis, and ecological risk, as well as unforeseen logistical problems, completing the project on schedule and within budget.

Southern Division Restoration Employee of the Year
Mr. Art Conrad - Mr. Conrad is the Installation Restoration RPM for Naval Construction Battalion Center (NCBC) Gulfport, NAS Meridian, Naval Weapons Industrial Reserve Plant (NWIRP) Bristol and Stennis Space Center. At NWIRP Bristol, Art was instrumental in executing several Removal Actions to facilitate the early transfer of the property. NWIRP Bristol was one of the first Government Owned Contractor Operated (GOCO) facilities to be sold off and the first to utilize the CERCLA early transfer authority. It was also a CNO test case for utilizing claimant funds to supplement ER,N funding so that transfer could happen more expeditiously. At NCBC Gulfport, Art has overseen a complex effort to address dioxin contamination resulting from storage of Agent Orange during the Vietnam War. The dioxin

contamination has migrated off-base and Art worked closely with the state and adjacent property owners to establish Brownfields agreements that would allow us to use the industrial standards off base.

Engineering Field Activity West Restoration Employee of the Year
Mr. Juris A. Sinats - As the Lead RPM for NAS Lemoore, Juris Sinats has repeatedly made important contributions to the Navy Installation Restoration Program, especially during 2002. This year, through his attention to regulator concerns, Juris succeeded in resolving longstanding disagreements regarding No Further Action Decisions and Future Land Use issues at multiple sites. In addition, by coordinating input from outside experts, he facilitated the identification of modifications to improve the effectiveness of an existing multiphase extraction system and implemented them with limited funding.

Multiphase Extraction

The multiphase extraction system used at Naval Air Station Lemoore to cleanup a subsurface jet fuel spill is streamlining cleanup and closure (see page 3-48).

Atlantic Division Restoration Employee of the Year
Mr. Ed Corl - Mr. Corl supports the Navy Installation Restoration Program as a chemist in the Environmental Technical Support Section. His expertise in ecological risk assessments is critical to many of the cleanup decisions made in the Installation Restoration Program at the Atlantic Division. He has been instrumental in the resolution of numerous difficult ecological and chemistry-related issues. He implemented the use of statistically defensible decision criteria in ecological risk assessments. He is also working with the Space and Naval Warfare Systems Command (SPAWAR) and other government agencies to develop groundbreaking research material to support polycyclic aromatic hydrocarbon (PAH) identification. This technology will potentially enable the differentiation between PAH contamination attributable to a Navy source and PAH contamination from another responsible party. He has worked to improve the detection levels of analytical results presented by Navy cleanup contractors.

Engineering Field Activity Chesapeake Restoration Employee of the Year
Mr. Neal Parker, Jr. - Neal Parker has made significant contributions to the Navy Installation Restoration Program as the EFACHES ecological risk assessor and RPM for Solomons Complex, Solomons, MD. Mr. Parker has provided outstanding leadership and support on ecological risk assessments for EFACHES facilities. He was instrumental in assisting with the planning and completion of these risk assessments with the ultimate goal of achieving closure at a number of EFACHES sites. His interaction and communication with project managers,

technical support, and contractor personnel built valuable relationships between all agencies and has acted as a catalyst for the continued productivity and cooperation between all parties.

Engineering Field Activity Northwest Restoration Employee of the Year
Ms. Patty Kelly - Ms. Patty Kelly is the Lead Remedial Project Manager for SUBASE Bangor, and despite her intense work load at SUBASE Bangor, she took on projects at other installations in Alaska, such as NAS Adak and Naval Arctic Research Laboratory (NARL) Barrow. She is frequently called upon to meet the urgent, tough, high visibility tasks and she was the lead at an outstanding FY 2002 Tri-Services Alaska Forum.

Naval Facilities Engineering Services Center
Restoration Employee of the Year
Mr. Bryan Harre - Technical information from Mr. Harre's projects has been used as source materials for a number of Remediation Innovative Technology Seminars (RITS). Examples include alternate landfill caps, constructed wetlands, and perchlorate technologies. Mr. Harre was the former RPM for NCBC Port Hueneme and he ensures that the RPM perspective is included in his demonstration projects. His ability to bring together both the technology development community and the users was recognized when he won the Strategic Environmental Research and Development Program (SERDP) Project of the Year in 2001. In addition to developing coastal migration monitoring methods, he is working with the Air Force Center for Environmental Excellence to bring the most current anaerobic bioremediation information to the RPMs in a concise document. This last year he provided exemplary support to CNO for DoD's perchlorate work group.

State Partners

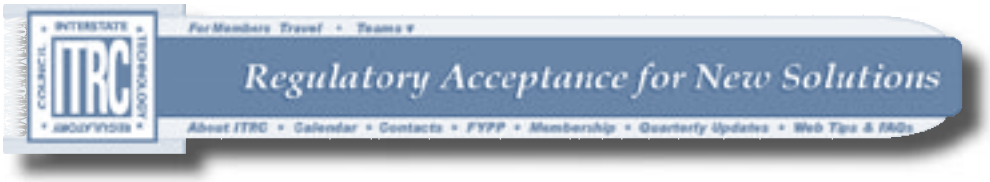
The Interstate Technology Regulatory Council (ITRC) is a state-led coalition working together with industry and stakeholders to achieve regulatory acceptance of environmental technologies. ITRC consists of 40 states, the District of Columbia, multiple federal partners, industry participants, and other stakeholders, cooperating to break down barriers and reduce cleanup and compliance costs, making it easier to use new technologies, and helping states maximize resources. ITRC brings together a diverse mix of environmental experts and stakeholders from both the public and private sectors to broaden and deepen technical knowledge and streamline the regulatory acceptance of new environmental technologies. ITRC accomplishes its mission in two ways: it develops guidance documents and training courses (both

classroom- and Internet-based) to meet the needs of state and federal regulators and federal and private responsible parties. ITRC works with state representatives to ensure that ITRC products and services have maximum impact among state environmental agencies and technology users.

The Navy works with the other DoD services and federal partners to support the ITRC by providing funding and technical experts to participate in many of the technology and topic-specific ITRC work groups. The Navy representatives ensure that the technical teams are aware of Navy and DoD issues, concerns, and policies, as well as the latest DoD research and development results. This ensures that the ITRC documents can be most effectively developed and used by DoD as well as other interested parties. Numerous case study examples are provided by Navy project managers to ensure lessons learned are identified in the ITRC products. Once DoD has concurred with the ITRC documents, the Navy uses its many internal work groups to distribute and promote the ITRC products and maximize their benefits to the cleanup efforts. Further information regarding ITRC products, services, teams, and general information can be found on their web site at *http://www.itrcweb.org*.

ITRC Website

http://www.itrcweb.org



The Navy also supports the Defense and State Memorandum of Agreement (DSMOA)/Cooperative Agreement (CA) Program to reimburse states or territories for services related to expediting restoration activities. A DSMOA is a legal agreement between DoD and a state or territory covering defense reimbursement of costs for services to be provided by a state or territory. A CA is the funding mechanism by which a state or territory receives funds for reimbursement of DSMOA-eligible services. CA-eligible services include technical review of documents, travel costs for site visits, public participation support, RABs, identification and explanation of Applicable or Relevant and Appropriate Requirements (ARARs), limited quality assurance/quality control (QA/QC) sampling and analysis, and administration costs for DSMOA and CA.

Community Partners

Restoration Advisory Boards (RABs)

RABs bring together people who reflect the diverse interests within the local community, enabling the early and continued flow of cleanup information among the affected community, DoD, and environmental oversight agencies (Figure 2.4). The Navy and Marine Corps have established RABs at more than 90 active and BRAC installations. RABs have provided invaluable service to DON by providing a community perspective on cleanup issues and acting as a conduit for sharing information. Although community RAB members volunteer their time, all RAB members spend hundreds of hours reviewing documents and providing advice on cleanup strategies. The success of DON's cleanup efforts is linked to community acceptance of the remedies implemented. Over the last nine years, DON has been working with RABs to build community trust and alliances to the benefit of all.

Figure 2.4. RAB meetings allow partners from DON, regulatory agencies and the community to discuss plans and develop solutions that are acceptable to all parties.

Technical Assistance for Public Participation (TAPP)

DoD's Technical Assistance for Public Participation program provides technical assistance to local community members of RABs and Technical Review Committees (TRCs).

Community involvement is critical to the acceptance of the cleanup activities implemented at Navy sites. TAPP provides RABs and TRCs with funding to seek third party, independent technical experts to review documents and provide explanations of often complex treatment technologies. In the past, the TAPP program has provided the extra measure of confidence for communities to embrace DON cleanup decisions.

Also, DON will continue to look for other ways to interact with the RABs, via workshops, newsletters, and other means of communication. In the next few years as DON continues to expand the Munitions Response Program and proceeds toward closing out IRP sites, community feedback will continue to guide these efforts. DON is planning to hold a RAB training workshop in 2004. The workshop will bring both community RAB co-chairs and DON RAB co-chairs together to discuss a number of technical issues and to share lessons learned.

NAVFAC Environmental Restoration Web Page

The new NAVFAC Environmental Restoration Web Page can be found at:

http://enviro.nfesc.navy.mil/scripts/WebObjects.dll/erbweb

The NAVFAC Environmental Restoration Web Page is a very cost-effective way to transfer information and guidance documents and other products to the NAVFAC environmental community. Improvements to the web page were completed in FY 2003 to enhance its design and functionality (Figure 2.5). The new and improved web page is database driven, which enables rapid updates and additions to the site. The web page will continue to act as a library for the valuable information generated by past and current NAVFAC research and development work, as well as information from outside resources, such as EPA, DoD, and industry research and development efforts. The new web page can be found at: http://enviro.nfesc.navy.mil/scripts/WebObjects.dll/erbweb.

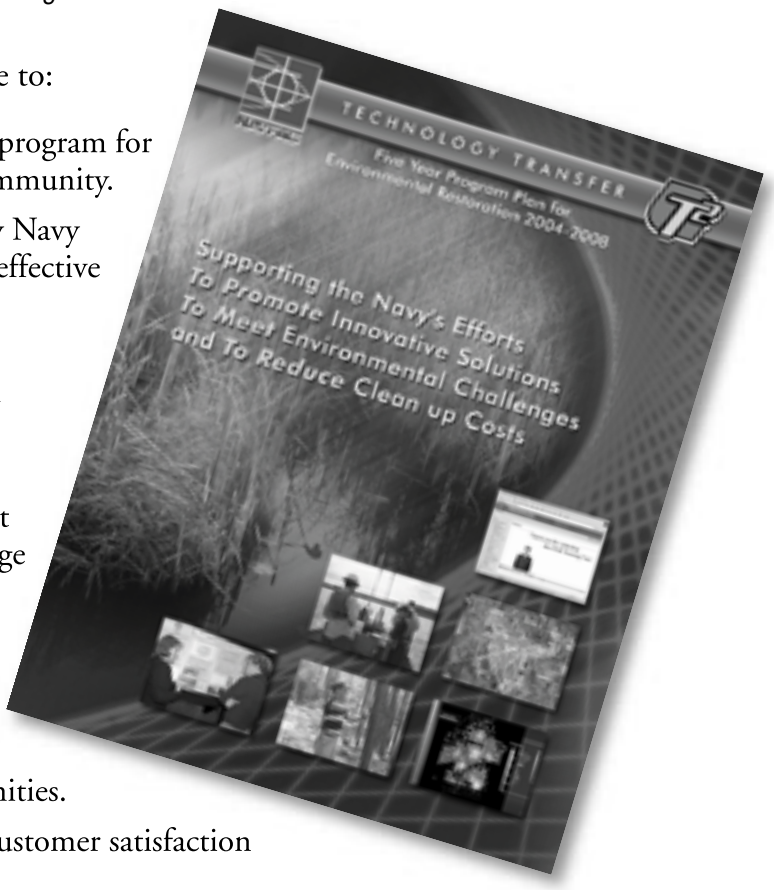
Figure 2.5. The new look of the NAVFAC Environmental Restoration and BRAC web page.

Technology Partners

Technology Transfer (T2) Program

One of DON's major partnering efforts is NAVFAC's Technology Transfer (T2) Program (Figure 2.6). Partners in T2 include the Navy, industry, and academia. The T2 Program was created to increase awareness of new technological innovations and to promote the understanding of new methods for improved performance and/or cost-effectiveness in the Installation Restoration Program and Munitions Response Program.

Figure 2.6. The Technology Transfer Program.



The primary objectives of the T2 Program are to:

- Build a world-class technology transfer program for the Navy environmental restoration community.
- Identify and address challenges faced by Navy RPMs in achieving successful and cost-effective environmental restoration.
- Facilitate the transfer of lessons learned by one Navy RPM and/or EFD or EFA for the benefit of the entire NAVFAC environmental restoration community.
- Communicate information about recent advances and new innovations to leverage Navy investments in research and development.
- Raise awareness of new technologies and approaches and overcome the barriers that restrict Navy RPMs from taking advantage of these new opportunities.
- Use feedback mechanisms to measure customer satisfaction and to circulate knowledge and ideas.

The T2 Program gathers information from personnel within NAVFAC technical work groups and Navy research and development programs. It also gathers information on overall IRP trends directly from Navy RPMs through their input into the NORM/CTC database. T2 also considers input regarding the latest advances being made by industry and academic leaders in the field. In addition, new feedback mechanisms directly survey Navy RPMs and others to improve understanding of end user requirements. All of this input is analyzed annually and used to write the subsequent Fiscal Year's Work Plan for the T2 Program.

FY 2003 T2 Products

In FY 2003, the T2 Program created many products that promote interaction with end users and encourage information exchange with technology developers. The main mechanism for promoting the transfer of technology throughout NAVFAC is the development and distribution of multimedia training tools. Web-streaming multimedia tools (Figure 2.7) provide enhanced opportunity for NAVFAC to exchange information using animated graphic art, video, audio, pictures, as well as text and hypertext web links. These T2 multimedia training tools include contaminant-specific tools, technology-specific tools, web data sheets, and case studies (Figure 2.8). The products created in FY03 are presented on the next page in Table 2.1. Quarterly T2 Email Updates were sent to Navy RPMs announcing newly developed tools, regulatory updates, training schedules, and other relevant T2 Program announcements. The T2 Program, when appropriate, produces additional products that are not web-based. Some of these products include:

Figure 2.7. T2 web-streaming multimedia tools.

- Guidance Documents
- Success Stories
- Journal Articles
- RPM Newsletter Articles
- Conference Presentations
- Conference Posters
- Technology Brochures.

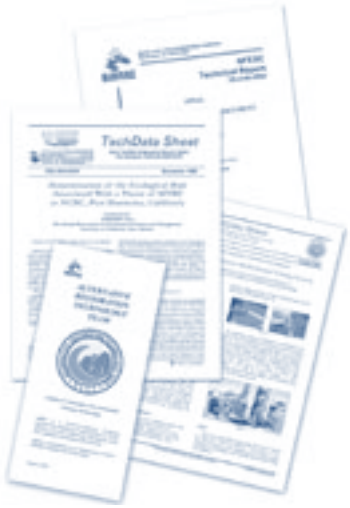


Figure 2.8. Examples of T2 tools.

T2 Products for Fiscal Year 2003

Product	Title
Web Data Sheets	Degradation of Ordnance Constituents in Marine Sediments Data Sheet Encapco Soil Stablization Data Sheet Implementation of Office of Naval Research (ONR) Harbor Processes Data Sheet In-Situ Reactive Zone (IRZ) Data Sheet Polychlorinated Biphenyls (PCB) Data Sheet Perchlorate Groundwater Cleanup Technologies Data Sheet Permeable Reactive Barriers (PRB) Data Sheet
Web Training Tools	Amphibians Risk Assessment Training Tool Dense Nonaqueous Phase Liquids (DNAPL) Detection and Characterization Training Tool PCB Training Tool PRB Training Tool
Case Studies	Naval Weapons Station Charleston Innovative Technologies Web Page
Email Updates	Email Updates released in June, September, December 2003
RPM Newsletter Articles	Pressure-Driven Bioventing Demonstrations Updated T2 News Encapco Soil Stabilization Evaluation and Performance of Costs Associated with Anaerobic Dechlorination Coastal Contamination Migration Monitoring Implementation of ONR Harbor Processes Enhanced Natural Attenuation
Other Journal Articles	Coastal Contamination Migration Monitoring
Training Courses	90-Minute Civil Engineer Corps Officers School (CECOS) Training Course on Remedy Selection Monitored Natural Attenuation Course Assistance
Feedback Surveys	Diffusion Sampler Survey Fiscal Year 2003 General T2 Survey

Table 2.1. FY2003 Technology Transfer products.

Planned T2 Products for FY 2004

The following subject areas are proposed for the development of technology transfer products in Fiscal Year 2004:

- DCE/VC Stall
- In Situ Chemical Oxidation
- Diffusion Samplers
- Energetics
- Benthic Flux Sampling Devices
- Emulsified and Nanoscale Zero-Valent Iron.

The remaining T2 topics will be determined by the NAVFAC T2 team lead based upon input from Navy stakeholders. The T2 products for FY 2004 will be in the following proposed formats: web-based training tools, web-based case studies, T2 Email Updates, articles in the RPM Newsletter, Tech Transfer News page for RPM News, T2 surveys and feedback, Cost and Performance Reports, and Cost Avoidance Reports.

Proposed T2 Products for Fiscal Years 2005 to 2008

The specific product topics for each year will be generated from a variety of sources, including the following:

- NAVFAC Work Group Input
- NORM/CTC Database Review
- Statement of Needs from the Strategic Environmental Research and Development Program (SERDP)
- Statement of Needs from the Environmental Security Technology Certification Program (ESTCP)
- Industry and Academic Outreach
- Annual T2 Survey Results.

Field Partners – NAVFAC Technical Work Groups

CNO and NAVFAC have established work groups that target specific issues in environmental remediation. Work group members are selected from within the Navy's remediation staff and are at the forefront of the various topics as they evolve, developing guidance and promoting transfer of information among RPMs and others involved in remediating sites. The work groups meet several times each year to develop strategies and discuss progress as they work to address complex environmental problems and ultimately achieve more effective cleanup of contaminated sites. There are currently seven work groups addressing environmental restoration topics:

- Alternative Restoration Technology Team Work Group (ARTT)
- Cost-to-Complete Work Group (CTC)
- Installation Restoration Records Management Work Group (IRRM)
- Installation Restoration Geographic Information System/Data Management Work Group (IRGIS)
- Munitions Response Work Group (MR)
- Remedial Action Operations/ Long-Term Management Optimization Work Group (RAO/LTMgt)
- Risk Assessment Work Group (RAW).

Below are descriptions of each of the work groups, their objectives, recent achievements, and future plans.

Alternative Restoration Technology Team (ARTT) Work Group

The Alternative Restoration Technology Team (ARTT) Work Group was established to promote the use of cost-effective, innovative technologies in the Navy's Installation Restoration Program. The ARTT carries out its charter by fostering partnerships, supporting research and technical resources, and encouraging participation in NAVFAC-wide efforts. ARTT consists of representatives from CNO, Commandant of the Marine Corps, NAVFAC Headquarters, the Naval Facilities Engineering Services Center (NFESC) and remedial technical managers (RTMs) or RPMs representing each of NAVFAC's EFD/As.

ARTT members provide quarterly project updates about innovative technologies used at each EFD/A. Each component can then benefit from the experiences of others. In addition, ARTT works closely with other NAVFAC work groups and the Office of Naval Research (ONR). The ARTT also has established relationships with ITRC, EPA, the U.S. Geological Survey (USGS), and other DoD services. ARTT representatives act as an important link between these groups and cleanup personnel in the field.

The ARTT supports training courses for Navy RPMs that promote interaction among cleanup personnel and recognized industry experts, and that provide input for future research proposals and the selection of potential field project sites. The ARTT provides an annual review of potential NAVFAC proposals for the DoD's ESTCP and reviews and ranks future needs for the Navy's YO817 Program. Also, ARTT members provide technical expertise on Cleanup Review Tiger Teams. Tiger Teams are often initiated at sites that have high potential cleanup costs, high visibility, and/or would benefit from a global NAVFAC perspective.

The accomplishments of the ARTT in 2003 include:

- Made recommendations for the update of NAVFAC's Environmental Restoration Web Page to incorporate feedback from the Navy RPMs.
- Supported and raised awareness of key research and development efforts.
- Provided guidance for the selection of T2 topics.
- Shared information on the selection of innovative technologies. The ARTT is currently tracking the progress of several full-scale projects including chemical oxidation, phytoremediation, permeable reactive barriers, resistive heating, and micro-scale zero-valent iron injection.

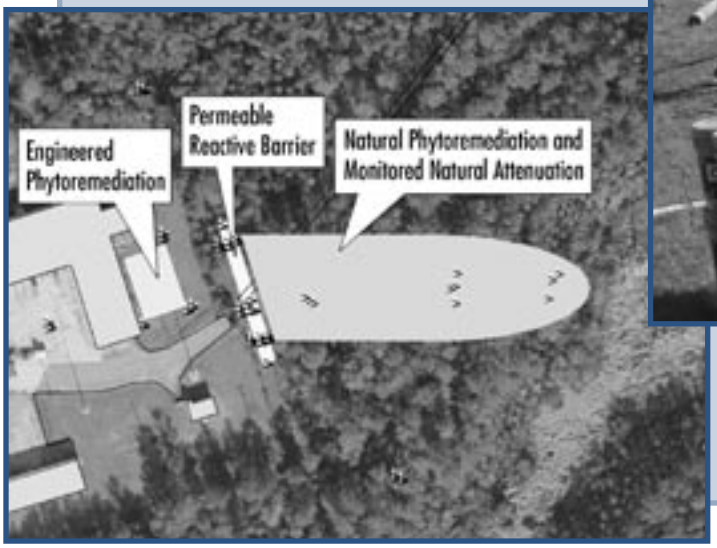
- Participated in Tiger Teams held for Naval Air Station North Island and Marine Corps Base Camp Pendleton.
- Provided input for two workshops on innovative technologies and two RITS seminars. The workshops were on Monitored Natural Attenuation Timeframes and Environmental Forensics.

In 2004 and beyond, the ARTT will continue to pursue its mission objectives. These objectives include:

- Increasing technical support through information dissemination
- Partnering with NFESC to develop and improve T2 tools
- Maintaining strong support of training initiatives
- Tracking the use of innovative technologies through quarterly updates.

Innovative Treatments for Groundwater

Marine Corps Logistics Base Albany completed four pilot tests of in situ methods for treating chlorinated organic compounds in groundwater (see page 3-37).



Naval Weapons Station Charleston used a sequence of passive technologies to treat groundwater (see page 3-34).

Cost-To-Complete Work Group (CTC)

The Cost-To-Complete (CTC) Work Group consists of environmental professionals from each EFD/A, NFESC, and NAVFAC Headquarters. The work group was formed to support the development of the NAVFAC CTC system and to ensure that the needs and perspectives of each office are addressed. Primary objectives of the CTC Work Group include supporting and promoting sound cost estimating practices for the Navy's cleanup efforts.

The EFD/As, NFESC, and NAVFAC Headquarters are each responsible for assigning team members, as appropriate. Work group members perform the following tasks:

- Evaluate needs and develop requirements for improvements to the CTC system.
- Implement improvements through test and evaluation.
- Provide input/data for model development.
- Serve as the primary training link to the EFD/A for implementing guidance and providing support for CTC.
- Help ensure credibility of CTC cost estimates and documentation of costs.

CTC Work Group accomplishments during FY 2003 include:

- Developing five new cost models (Five-Year Review, Remedial Action Optimization Studies, Hot Air Vapor Extraction, In-Situ Bioremediation, and Land Use Controls).
- Updating existing models based on field comments to comply with accreditation requirements.
- Developing and reviewing online CTC/NORM training classes.
- Reviewing new area cost factors implemented for the mid-year budget submit.

CTC Work Group activities in FY 2004 will include:

- Conversion of all CTC cost models into an XML standard to facilitate sharing of cost models with other agencies.
- Development of new cost models for the Munitions Response Program.
- Validation of CTC cost models against historical costs.
- Comprehensive on-line Beta test of all updated CTC cost models.

Mare Island Naval Shipyard (see page 3-19).

Several facilities have progressed toward early transfer of property avoiding costs for DON and benefiting their partners.

Naval Training Center Orlando (see page 3-24).

Naval Weapons Industrial Reserve Plant Toledo (see page 3-31).

Naval Computer and Telecommunications Station Stockton (see page 3-27).

Installation Restoration Records Management Work Group (IRRM)

The Installation Restoration Records Management (IRRM) Work Group, formerly known as the Administrative Record Management System (ARMS) Work Group, functions as an advisory group to Installation Restoration Managers. This work group investigates and recommends improvements to Installation Restoration records management systems and develops guidance for the implementation of those improvements. The work group is composed of representatives from the EFD/As, NFESC, and NAVFAC Headquarters. CNO and NAVFAC provide policy, guidance, and funding to support the work group. The name was changed to reflect an increase in the scope of the work group. The work group now looks at all Installation Restoration documents (pre- and post-ROD), not just those that make up the Administrative Record (AR). Specific tasks of the IRRM Work Group include:

- Reviewing and updating the CERCLA Administrative Records Management System User's Guide every two years or as necessary to remain current with applicable laws, regulations, and technology.
- Addressing the management of other Installation Restoration documentation including post-ROD documents, project manager files, and other site files.
- Sharing information to ensure common business practices and consistent records management work products between EFD/As.
- Communicating with other DoD services to share ideas and lessons learned on managing Installation Restoration records.
- Providing input to the EPA regarding OSWER guidance on managing Installation Restoration records.
- Developing and updating course materials on Installation Restoration records management training for CECOS and other seminars, as needed.
- Reviewing and maintaining the work group web page.

During FY 2003, the IRRM Work Group held a series of conference calls to discuss issues, resolve problems, and assign action items. Issues discussed included:

- EPA OSWER guidance and how it is implemented at DoD.
- Site File definition and inclusion of a Site File chapter in ARMS User's Guide.
- Disaster preparedness plans.

- Guidelines for electronic document and email management.
- DON records retention schedule, Administrative Records are not "permanent" records.
- Differences in SECNAVINST 5212 Chapters 5 and 11 retention schedules.
- Adminstrative Records/Site Files/Working Files: Definitions and how they fit together.
- How to approach security issues with information in Information Repositories, Site Files, and Administrative Records.

The Interim Draft ARMS User's Guide (revised 2002) is now available on the NAVFAC Environmental Restoration and BRAC web page at this location: *http://enviro.nfesc.navy.mil/erb/erb_a/support/wrk_grp/arms/ARMSGuide.pdf*

Interim Draft ARMS User's Guide (revised 2002)

http://enviro.nfesc.navy.mil/erb/erb_a/support/wrk_grp/arms/ARMSGuide.pdf

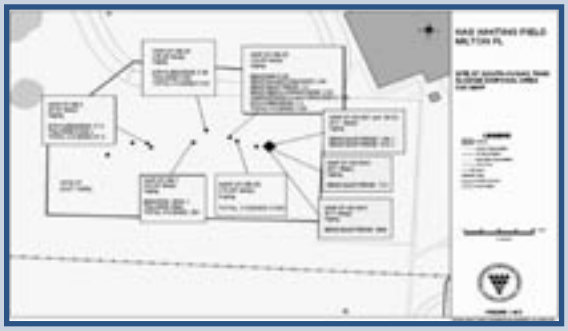
Installation Restoration Geographic Information System (IRGIS)/Data Management Work Group

The Installation Restoration Geographic Information System (IRGIS)/Data Management Work Group was established to develop a corporate methodology using common business practices for managing and facilitating the use of Installation Restoration data through web-based GIS applications in a consistent and cost-effective manner. Restoration projects typically have thousands of spatial data records. Naval Installation Restoration Information Solution (NIRIS) will efficiently manage vast amounts of restoration data, and provide analysis and visualization tools to ensure that effective cleanup decisions are made in cooperation with a diversity of contractors, regulators, and other stakeholders.

NIRIS will ensure that critical program data are maintained and accessible over the lifecycle of the Installation Restoration Program and beyond. NIRIS is compliant with the Federal Computer-Aided Design and Drafting (CADD)/GIS Centers Spatial Data Standards (SDS) for Facilities Infrastructure and Environment. This will allow data to be shared between other SDS compliant databases, minimizing duplicative data collection and management. NIRIS will assist NAVFAC in meeting its small disadvantaged business goals, because all contractors will have access to NIRIS, allowing access to all historic Installation Restoration data. Design and testing of Version 1.0 was completed in September 2003. Additional program functionality tools are scheduled for completion in 2004.

Beginning in 2004, user tools for data visualization, data analysis and data validation will be completed and fully functional, enabling full system implementation.

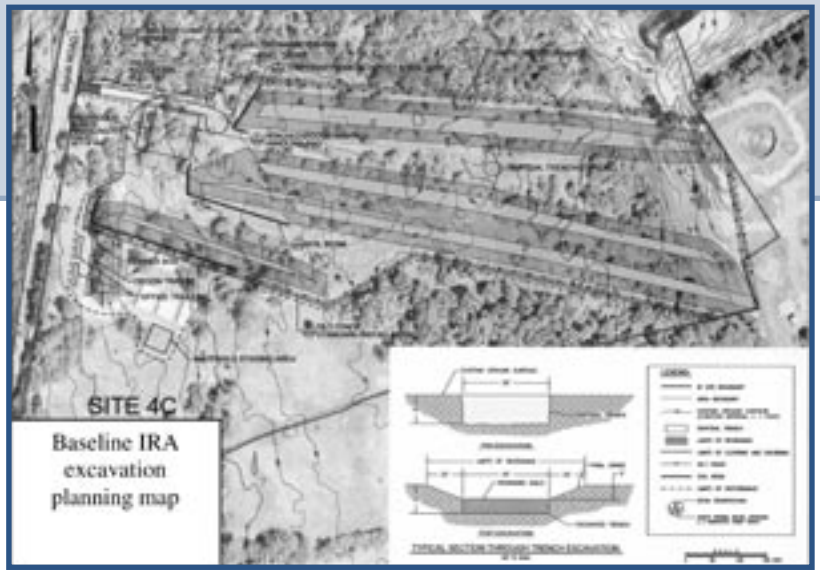
GIS and Web Technologies Expedite Remediation



E-conferencing allowed partners at Naval Air Station Whiting Field to share information without the cost and inconvenience of travel (see page 3-7).

Southern Division Partnering Teams are using Web technology for collaboration and sharing GIS information (see page 3-3).

Naval Air Station Patuxent River integrated site investigation and interim removal to improve efficiency (see page 3-79).

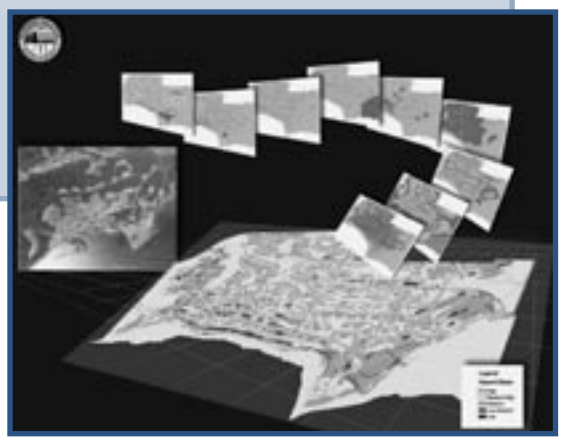


Munitions Response Work Group (MR)

The Munitions Response (MR) Work Group has been established as an advisory group to the Installation Restoration Managers Work Group to develop NAVFAC-wide MR guidance, and to promote the use of the best available technologies and methodologies for managing cleanup of Munitions and Explosives of Concern (MEC) and Munitions Constituents (MC) on Navy installations.

Munitions Hazard Assessment

Munitions Hazard Assessments were performed for Jackson Park Housing Complex/Bremerton Naval Hospital (see page 3-76).



Members of the MR Work Group include technical representatives from CNO (N45), Marine Corps Headquarters, Naval Facilities Engineering Command (including Headquarters, EFD/As, NFESC, and Civil Engineering Corps Officer School [CECOS]).

During the last year, the MR Work Group provided input on the DoD MR Site Prioritization Protocol, the ITRC's MR Historical Records Review document, the first Preliminary Assessments for the Munitions Response Program, and standard contract language for MR contracts. In addition, members of the MR Work Group provided training to the RPMs with the Munitions Response Site Management Course. The work group also began developing guidance on MR contract scopes of work and held a joint meeting with the U.S. Army Engineering and Support Center, Huntsville to exchange lessons learned on MR sites.

In the future, the MR Work Group will continue to perform the following tasks as they relate to the Navy's Munitions Response Program:

- Identify programmatic and project barriers related to the implementation of the Munitions Response Program.
- Recommend procedures and guidance on Navy munitions-related restoration issues.
- Develop a MRP cleanup quality assurance program for use at Navy facilities.
- Provide input to MR RPM training courses; identify technology needs and requirements to improve implementation of the Munitions Response Program.
- Participate with research and development technology evaluation programs.
- Provide success stories and lessons learned to assist other RPMs in implementing MRP projects.

Historical Munitions Production

Historical Munitions Production at Naval Ammunition Depot Puget Sound, now Jackson Park Housing/ Bremerton Naval Hospital (see page 3-76).

Remedial Action Operations/Long-Term Management Optimization Work Group (RAO/LTMgt)

The goal of the Remedial Action Operations (RAO) /Long-Term Management (LTMgt) Optimization Work Group is to promote the optimization of RAO and LTMgt in the Navy Installation Restoration Program. The ultimate purpose is to achieve efficient, protective, and cost-effective site closeouts. The group is also tracking Navy lessons learned for obtaining cost-effective RAO and LTMgt contract services. The work group is comprised of representatives from CNO, the Navy's EFD/As, NFESC, and NAVFAC. Since optimization of environmental restoration actions is required under DoD guidance, the work group strives to develop products, tools, and guidance documents that provide clear and consistent approaches to optimization and site closeout.

To facilitate collection and tracking of optimization data, the RAO/LTMgt Work Group and NAVFAC headquarters are developing a new section within the NORM data management system. Within this section, the project manager can report baseline conditions, optimization studies and recommendations, implemented strategies, and progress in terms of cost avoidance and improved results. This type of information can be used to illustrate NAVFAC's optimization activities and lessons learned.

In FY 2003, the RAO/LTMgt Work Group completed a new guidance document to assist Navy RPMs and their contractors. The *Guidance for Optimization Remedial Action Operation (RAO)* is a link that presents a step-wise process for optimizing RAO projects. The objective is to provide information on how to reduce operating costs while maintaining program effectiveness.

Two additional guidance documents were initiated in FY 2003 and will be available in 2004. The *Guide for Optimizing Remedy Evaluation, Selection and Design* will provide guidance for optimizing the remedy evaluation, selection, and design phases by incorporating technology life-cycle concepts and serve as a companion to previous NAVFAC optimization guidance. Life-cycle considerations include designing for the entire life of the project (not just initial conditions), addressing asymptotic contaminant removal over time, selecting the target treatment area, developing an exit strategy, transitioning to an alternate treatment technology such as monitored natural attenuation, and developing a site closure strategy.

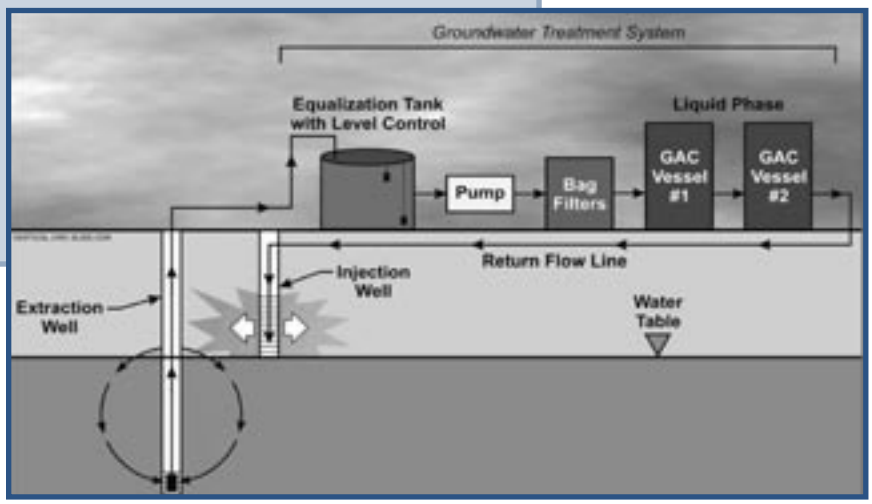
The *Guide for Documenting Site Closeout* will outline a consistent approach for Navy RPMs to follow in recognizing and documenting specific milestones for achieving site closeout. Specific documents are needed at appropriate stages of the closeout process to record agreements. In addition, as regulators and Navy RPMs change with a project over time, it is important that decisions and milestones are documented and adhered to. This may be increasingly important as some ER,N funded sites move on to the BRAC V list.

Finally, the RAO/LTMgt Work Group completed a survey of DON pump and treat (P&T) systems and issued a special report of the findings: *Groundwater Pump and Treat Systems* (NFESC Special Publication SP-2129-ENV, February 2003). Operational and cost information on all DON P&T systems as well as information about any optimization efforts were collected and analyzed. The report provides a summary of the information collected on DON P&T systems and makes recommendations for their optimization and management.

The RAO/LTMgt Work Group also partners with the ITRC Remedial Process Optimization team. The ITRC Remedial Process Optimization team is planning to develop an optimization guidance document for regulators. The team is currently finalizing a factsheet about the team's purpose and goals and has also developed an outline for the group's technical regulatory guide.

Optimization Success

Optimization at Marine Corps Air Station Yuma led to discontinuation of the Vertical Circulation Treatment System that was no longer needed *(see page 3-56).*



Risk Assessment Work Group (RAW)

The NAVFAC Risk Assessment Work Group (RAW) was formed in June 2000 to address both ecological risk assessment and human health risk assessment issues and to bring consistency to risk assessments being done in the DON's Installation Restoration Program through the exchange of information among the EFD/As. The group meets about three times a year and has regular attendance from NAVFAC Headquarters, the EFD/As and NFESC. Other regular work group members include the Navy Environmental Health Center (NEHC), SPAWAR Systems Center (SSC), ONR, and CECOS.

All RAW documents can be found on the risk assessment Web page

http://enviro.nfesc.navy.mil/scripts/WebObjects.dll/erbweb

(Click on Work Groups on the left side menu, then on RA Work Group)

The RAW's accomplishments in 2003 include the completion of three guidance documents to assist RPMs and their contractors as they characterize and remediate IRP sites:

- The *Implementation Guide for Assessing and Managing Contaminated Sediments at Navy Facilities* identifies and discusses sediment-specific issues related to site characterization, risk assessment, and remedial alternative evaluation, and directs the reader to related Web sites and resources for more detailed technical information.
- The *Guidance for Environmental Background Analysis, Volume II: Sediments* is the second of a series devoted to background analysis that provides instructions for characterizing background conditions at sites where past property uses have resulted in actual or suspected chemical releases. *Volume I: Soils* was released in April 2002 and focuses on background analyses of chemicals in soils. *Volume III: Groundwater* will be finalized and released during FY 2004.
- The *Guide for Planning and Conducting Sediment Porewater Toxicity Identification Evaluations (TIE) to Determine Causes of Acute Toxicity at Navy Aquatic Sites* provides guidance for planning and conducting TIE studies that aid in characterizing and managing toxic freshwater and marine sediments associated with naval facilities.

The RAW also took an active role in supporting the research and development (R&D) community in FY 2003 by participating in ranking and reviewing needs and project proposals for NAVFAC's YO817 R&D funding line and reviewing project proposals for the Strategic Environmental Research and Development Program (SERDP). The RAW also participated in a YO817 funded project on contaminant fingerprinting that developed a user's guide for optimizing the assessment of contaminant sources in sediments near naval facilities.

Within the RAW, several subgroups are working on specific issues:

Background Subgroup – The subgroup is developing guidance on various approaches for determining background concentrations of contaminants and how to apply the information at IRP sites. Volumes 1 and 2 for soil and sediment are complete. Volume 3 for groundwater is in progress.

Environmental Monitoring Subgroup – The subgroup worked closely with EPA on guidance related to developing and executing environmental monitoring plans. The EPA document, *Guidance for Monitoring at Hazardous Waste Sites: Framework for Monitoring Plan Development and Implementation,* has not yet been signed out by EPA. Currently, the subgroup is developing guidance on monitoring for habitat restoration.

Lead Subgroup – The subgroup developed an issue paper to address the unique issues associated with conducting risk assessments for lead. This issue paper was completed in 2003 and the subgroup has disbanded.

Natural Resource Injury Subgroup – The subgroup is developing guidance that outlines the process of determining natural resource injury (NRI) at BRAC and IRP sites.

PCBs Subgroup – The subgroup is developing a three-part white paper on the use of various polychlorinated biphenyls (PCB) analyses, and assessing PCBs in human health and ecological risk assessments.

Research and Development Subgroup – The subgroup coordinates RAW efforts in support of the R&D community. Efforts include submittal and ranking of R&D needs, review and ranking of proposals, and review and technology transfer of R&D projects.

Sediments Subgroup – The subgroup developed a *Sediment Implementation Guide* that identifies key issues to be addressed when dealing with sediment sites. The group continues to support a variety of sediment issues at IRP sites.

Vapor Intrusion Subgroup – The subgroup is developing a white paper on vapor intrusion issues. The group communicates with multiple agencies to keep the entire RAW informed of current issues regarding vapor intrusion.

Risk Assessment Leads To Property Transfer

Human health risk assessment for Naval Air Warfare Center Indianapolis showed that PCBs in paint did not pose a significant risk allowing property transfer to proceed (see page 3-34).

During FY 2004, the RAW will finalize and release several guidance documents. These documents include:

- *Natural Resource Injury (NRI) Guidance* which will help RPMs integrate NRI considerations into their risk assessments to avoid future claims of natural resource damage.
- *Guidance for Habitat Restoration Monitoring: Framework for Monitoring Plan Development* which will guide RPMs as they begin a habitat restoration project and plan for the required monitoring.
- *Guidance for Environmental Background Analysis, Volume III*: *Groundwater* which will provide instructions for characterizing background groundwater conditions at sites where past property uses have resulted in actual or suspected chemical releases.

Site Restoration and Wetlands Creation

Naval Surface Warfare Center Dahlgren restored and created wetlands without disturbing the bald eagles nesting nearby *(see page 3-63).*

Training Partners

Remediation Innovative Technology Seminar (RITS)

The RITS provides training on new and innovative technologies, methodologies, and guidance under the Navy's Installation Restoration Program and Munitions Response Program. The Naval Facilities Engineering Command (NAVFAC) sponsors RITS in coordination with its EFD/As, and NFESC. RITS training serves as one of many ways the Navy promotes innovative technologies to achieve site restorations more efficiently, cost effectively, and with higher performance.

Although the RITS was developed primarily for the Navy's environmental restoration and BRAC environmental professionals, it is also available to other DoD personnel, the Navy's environmental cleanup contractors, and environmental regulators.

RITS Fall 2002 topics included:

- Remediation and Characterization Innovative Technologies
- Phytoremediation On-line Decision Tree Document Tool
- Remediation Technology Evaluation Tool (RTET)
- Bioslurping Cost Estimating Program Tool
- Volatile Organic Compound (VOC) Off-Gas Treatment Technologies Database Tool
- Ex Situ Groundwater Treatment Technologies Evaluation Tool.

RITS Spring 2003 topics included:

- Coastal Contamination Migration Monitoring
- Toxicity Identification Evaluation (TIE)
- Assessing Risk to Amphibians
- DNAPL Detection and Characterization Techniques
- Estimating Timeframes of Monitored Natural Attenuation (MNA).

RITS Fall 2003 topics included:

- ESTCP Program Information
- Preparing for Optimization and Site Closeout
- In Situ Chemical Oxidation: Case Studies and Technology Advances
- DCE/VC Stall at Natural Attenuation Sites.

RITS Spring 2004 will focus entirely on optimization of Remedial Actions with emphasis on 1) documenting the site closeout process, 2) developing Conceptual Site Models, 3) selecting technologies that optimize remedial operations, and 4) choosing performance monitoring and optimization tools.

The Navy will continue to offer RITS on new and innovative technologies, methodologies, and guidance under the Navy's Installation Restoration Program.

Drainage Control Improvement

Swale construction at Naval Air Weapons Station China Lake will prevent surface water "run-on" to landfill (see page 3-71).

Technical Seminars

The NFESC Environmental Department provides technical seminars on a regular basis for NAVFAC EFD/As and other Navy and Marine Corps personnel. These specialized seminars equip the RPMs and other technical personnel with applied information on remedial technologies and methodologies. In FY 2003, the following seminar was offered at two locations: MNA Two-Day Course: Estimating Times of Remediation Associated with Monitored Natural Attenuation and Contaminant Source Removal, San Diego, CA, Jul 22-23, 2003, and Charleston, SC, Aug 5-6, 2003.

CECOS Environmental Restoration Classes

https://www.cecos.navy.mil/

The Navy also offers training in environmental restoration through the Civil Engineers Corps Officers School (CECOS). Generally, the courses are offered at least twice each year.

The following courses were offered in FY 2003:

- Achieving Data Quality - Development and Review of Quality Assurance Project Plans
- Data Quality Objectives & Managing Quality Assurance
- Ecological Risk Assessment
- Environmental Background Analysis
- Environmental Geographic Information Systems
- Environmental Negotiation Workshop
- Geostatistics

- Hazardous Waste Operations (HAZWOPER) and HAZWOPER Refreshers
- Health & Environmental Risk Communication Workshop
- Human Health Risk Assessment
- Munitions Response Site Management
- Navy Installation Restoration Program
- Optimizing Remedy Selection and the Site Closeout Process.

CECOS partners with the other services and other agencies, when possible. The Achieving Data Quality course is a joint course with EPA. The Navy and EPA jointly developed the class to use the new Intergovernmental Data Quality Task Force quality assurance policy.

In addition, CECOS participates in the Interservice Environmental Education Review Board (ISEERB), which is an ongoing and successful effort to share environmental training resources among the services, a great manifestation of partnering. Many CECOS environmental remediation classes are "ISEERB approved", meaning the course has been either developed or reviewed by subject matter experts from the Army, Air Force, Coast Guard, Marine Corps, and Defense Logistics Agency to meet their training needs. The following CECOS courses are ISEERB approved: Health and Environmental Risk Communication, Environmental Negotiation Workshop, Ecological Risk Assessment, Human Health Risk Assessment. The Optimizing Remedy Selection course is being considered for ISEERB review by the Restoration sub-committee.

CECOS now offers the HAZWOPER 8-hr Refresher as an "on-line" class. More computer based or "exportable" training using new technologies in video streaming, interactive CD-ROM, and the internet are planned for the future.

Small Business Cleanup

Former Naval Air Station Dallas removed a 7-acre landfill using small business contractor (see page 3-66).

Research Partners

SERDP

The Strategic Environmental Research and Development Program (SERDP) is DoD's corporate environmental R&D program. It is planned and executed in full partnership with the Department of Energy (DOE) and EPA, with participation by numerous other federal and non-federal organizations.

SERDP projects with Navy involvement include:

- Pathway Ranking for In-Place Sediment Management (PRISM) (SPAWAR)
- NETTS Program - Naval Base Ventura County, Port Hueneme, CA (NFESC).

http://www.serdp.org/default.html

ESTCP

The Environmental Security Technology Certification Program (ESTCP) is a program designed to demonstrate and validate promising, innovative technologies that target the DoD's most urgent environmental needs through their implementation and commercialization.

http://www.estcp.org/

ESTCP projects with Navy involvement include:

- Fuel-Specific Bioslurper System Modifications for Enhanced Cost Effectiveness (CU-9908)
- Natural Pressure-Driven Passive Bioventing (CU-9715)
- Biodegradation of Dense Non-Aqueous Phase Liquids (DNAPL) Through Bioaugmentation of Source Areas (CU-0008)
- Dynamic Underground Stripping with Hydrous Pyrolysis Oxidation (DUS/HPO) - In-Situ Destruction of DNAPLs and Dissolved Contaminants in Groundwater (CU-0014)
- Remediation of Dense Non-Aqueous Phase Liquids through Sequential In-Situ Chemical Oxidation & Bioaugmentation (CU-0116)
- Evaluation of Performance and Costs Associated with Anaerobic Dechlorination (CU-0125)
- Enhancement of Source Area Reductive Dechlorination by the In Situ Formation of Catalytically-Active Iron Sulfide Precipitate (CU-0226)
- In-Situ Bioremediation of MTBE in Groundwater (CU-0013)

- Evaluation of Performance and Longevity at Permeable Reactive Barrier Sites (CU-9907)
- In-Situ Catalytic Groundwater Treatment Using Pd Catalysts and Horizontal Flow Treatment Wells (CU-0012)
- Demonstration and Validation of a Regenerated Cellulose Dialysis Membrane Diffusion Sampler for Monitoring Groundwater Quality and Remediation Progress at DoD Sites (CU-0313), (FY03 New Start)
- Prediction of Groundwater Quality Improvement Down-Gradient of In Situ Permeable Treatment Barriers and Fully Remediated Source Zones (CU-0320), (FY03 New Start)
- Enhanced Oxidative Bioremediation of Cis-Dichloroethene and Vinyl Chloride Using Electron Shuttles (CU-0316), (FY03 New Start).

Pilot study at Naval Weapons Industrial Reserve Plant McGregor installed an in situ biobarrier to treat perchlorate and trichloroethylene (see page __).

Migration of Contaminants Under Control

Sediments were removed from drainlines at Pearl Harbor Naval Complex Ford Island (see page).

A skimming vault was constructed to intercept free-phase petroleum product in the main storm drain line at Quarry Loch Pearl Habor Naval Complex (see page ___).